PCT/EP02/06400 90 909 q9/hba
LM Ericsson August 6, 2004

New Claims

1. Method of generating a mixed media stream from input media streams of a first type having payload data elements and related identifiers, respectively, comprising the step:

aligning the input media streams of the first type according to a pre-specified relation between identifiers in the input media streams of the first type before generating the mixed media stream,

characterized in that

the pre-specified relation between identifiers in the input media streams of the first type is matched to a relation between identifiers in further input media streams of a second type used during generation of a further mixed media stream from the input media streams of the second type, and

the matching of relations between identifiers in the input media streams of the first type and the further input media streams of the second type is achieved by

identifying an intersection between the input media streams of the first type and the further input media streams of the second type,

determining a relation between identifiers in the further input media streams of the second type for those further input media streams which are comprised in the intersection,

aligning the input media streams of the first type which are comprised in the intersection according to the relation of identifiers in the further input media streams of the second type.

2. Method according to claim 1, ***characterized in that*** the input media streams of the first type at a point in time are described by $I_S = [(q_1, n_1), (q_2, n_2), ..., (q_s, n_s)]$ with $\{q_1, q_2, ..., q_m\}$ as set of input media streams and $\{n_1, n_2, ..., n_s\}$ as set of identifiers in the input media streams at a point in time,

the further input media streams of the second type at a point in time are described by $I_M = [(s_1, i_1), (s_2, i_2), ..., (s_m, i_m)]$ with $\{s_1, s_2, ..., s_m\}$ as set of further input media streams and $\{i_1, i_2, ..., i_m\}$ as set of identifiers in the further input media streams of the second type at the point in time,

the intersection between the input media streams of the first type and the further input media streams of the second type is $S_A = \{s_1, s_2, ..., s_m\} \cap \{q_1, q_2, ..., q_s\}$, and

the relation between identifiers in the further input media streams of the second type for those further input media streams of the second type which are comprised in the intersection is determined on the basis of $I_S' = \bigcup_{j \in [1, ..., s]} \{(q_j, n_j) \mid q_j \in S_A\}$.

3. Method according to claim 2, ***characterized in that*** it further comprises a step of re-ordering the sequence of input media streams of the first type in the intersection according to the sequence of further input media streams of the second type in the intersection.

4. Method according to claim 3, ***characterized in that*** the re-ordering of the sequence of input media streams of the first type is achieved according to a permutation vector defined by $\underset{i\in[1,\ldots,|I_S'|]}{\forall}\{p(i)=j\in[1,\ldots,|I_S'|]\,|\,s_i=q_j\}$.

5. Method according to one of the claims 1 to 4, ***characterized in that*** the alignment of input media streams of the first type in the intersection is achieved by

determining a relative time delay for each input media stream of the first type such that relations between different identifiers in the input media streams of the first type after time delay correspond to relations between identifiers in the further input media streams of the second type, and

shifting each input media stream of the first type in time according to the related time delay.

6. Method according to claim 5, ***characterized in that*** the time delay for each input media stream of the first type is determined according to

$$\delta_i = i_i - n_{p(i)}, i = 1,\ldots,|I_S'|$$

$$\delta_i' = \delta_i - \max_{j \in [1,\ldots,|I_S'|]} \delta_j, i = 1,\ldots,|I_S'|$$

and each input media stream of the first type is shifted in time according to

$$q_{s_i}'(t) = q_{s_i}(t + \delta_i'), i = 1,\ldots,|I_S'| .$$

7. Method according to one of the claims 1 to 6, ***characterized in that*** an exchange of information regarding the pre-specified relation between identifiers is achieved through a signal transfer or a shared-memory mechanism.

8. Apparatus for generating a mixed media stream from input media streams of a first type having payload data elements and related identifiers of a second type, ***characterized by***

an identifier interface unit (20) for exchange of the pre-specified relation between identifiers in different input media streams, and

an alignment unit (22) adapted to align the input media streams of the first type according to the pre-specified relation between identifiers in different input media streams of a second type before generating the mixed media stream, wherein

the pre-specified relation is matched to a relation between identifiers in further input media streams of a second type used during generation of a further mixed media stream and that the matching of relations between

identifiers in the input media streams of the first type and in the further input media streams of the second type is achieved by

a pre-processing unit (28) adapted to identify an intersection between the input media streams of the first type and the further input media streams of the second type,

a calculation unit (30) adapted to determine a relation between identifiers in the further input media streams of the second type for those further input media streams of the second type which are comprised in the intersection, and

the aligning unit (32) adapted to align the input media streams of the first type which are comprised in the intersection according to the relation of identifiers in the further input media streams of the second type.

9. Apparatus according to claim 8, ***characterized in that***

the input media streams of the first time at a point in time are described by $I_S = [(q_1, n_1), (q_2, n_2), ..., (q_s, n_s)]$ with $\{q_1, q_2, ..., q_m\}$ as set of input media streams of the first type and $\{n_1, n_2, ..., n_s\}$ as set of identifiers in the input media streams of the first type at a point in time,

the further input media streams of the second type at a point in time are described by $I_M = [(s_1, i_1), (s_2, i_2), ..., (s_m, i_m)]$ with $\{s_1, s_2, ..., s_m\}$ as set of further input media streams of

the second type and $\{i_1, i_2, \ldots, i_m\}$ as set of identifiers in the further input media streams of the second type at the point in time,

the pre-processing unit (28) is adapted to determine the intersection between the input media streams of the first type and the further input media streams of the second type according to $S_A = \{s_1, s_2, \ldots, s_m\} \cap \{q_1, q_2, \ldots, q_s\}$, and

the pre-processing unit (28) is further adapted to determine the relation between identifiers in the further input media streams of the second type for those further input media streams of the first type which are comprised in the intersection on the basis of $I_S' = \bigcup_{j \in [1,\ldots,s]} \{(q_j, n_j) \mid q_j \in S_A\}$.

10. Apparatus according to claim 8 or 9, ***characterized in that*** the pre-processing unit (28) is further adapted to re-order the sequence of input media streams of the first type in the intersection according to the sequence of further input media streams of the second type in the intersection.

11. Apparatus according to claim 10, ***characterized in that*** the pre-processing unit (28) is adapted to re-order the sequence of input media streams of the first type according to a permutation vector defined by $\forall_{i \in [1,\ldots,|I_S'|]} \{p(i) = j \in [1,\ldots,|I_S'|] \mid s_i = q_j\}$.

12. Apparatus according to one of the claims 8 to 11, ***characterized in that*** the alignment of input media streams of the first type in the intersection is achieved by

the calculation unit (30) adapted to determine a relative time delay for each input media stream of the first type such that relations between different identifiers in the input media streams of the first type after time delay correspond to relations between identifiers in the further input media streams of the second type, and

a shifting unit (32) adapted to shift each input media stream of the first type in time according to the related time delay.

13. Apparatus according to claim 12, ***characterized in that*** the calculation unit (30) is adapted to calculate the time delay for each input media stream of the first type according to

$$\delta_i = i_i - n_{p(i)}, i = 1,...,|I_S'|$$

$$\delta_i' = \delta_i - \max_{j \in [1,...,|I_S'|]} \delta_j, i = 1,...,|I_S'|$$

and the shifting unit (32) is adapted to shift each input media stream of the first type in time according to

$$q_{s_i}'(t) = q_{s_i}(t + \delta_i'), i = 1,...,|I_S'|.$$

14. A computer program product directly loadable into the internal memory of a mixer unit comprising software code portions for performing the steps of one of the claims 1 to 7 when the product is run on a processor of the mixer unit.